SPECTRA OF SEA SURFACE HEIGHT VARIATIONS IN THE ABSENCE OF SCALE INVARIANCE

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Wave turbulence is a common property of oceanic wave motions, observed on scales from wind-induced surface capillary-gravity ripples and to those of inertia-gravity and Rossby waves. In general, oceanic wave motions are characterized by rather complicated dispersion laws which contain characteristic scales, such as the Rossby radius of deformation, etc. The resultant absence of scale invariance makes many problems of wave turbulence intractable by standard mathematical techniques (such as the kinetic equation approach). As a result, present theoretical understanding of wave turbulence has been limited to short- and long-wave asymptotic regimes.
A number of laboratory (wave tank) and field (satellite altimeter) measurements reveal certain important features of ocean wave spectra that cannot be explained by scale-invariant theories. Based on a recently developed ("multiwave-interaction") heuristic approach, we report analytical results for non-scale-invariant waves including capillary-gravit y ripples and inertia-gravity waves in a rotating ocean. The predicted spectra of wave turbulence are compared with the observed spectra showing remarkabl y good agreement.

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2. NP1 .3/0A25 Scaling, Multifractals and Nonlinear Variability in Oceans and Atmosphere
3. Daniel Schertzer, Shaun Lovejoy
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5. Oral
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